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THE
PSEUDO-PARASITISM

— OF —

DIPTERA IN MAN

— OR —

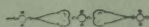
MYIOSIS.

presented by the author

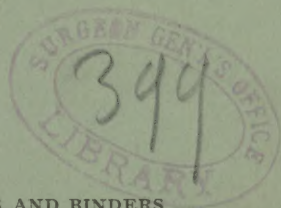
— BY —

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To my Teacher

Prof. Huŕo von Ziemssen,

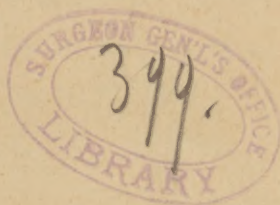
PRIVY COUNCELLOR,

This small pamphlet is affectionately dedicated by
THE AUTHOR

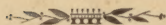
THE
PSEUDO-PARASITISM
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MYIOSIS.

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PREFACE.



THE following three articles were first published in the April, May and June 1889 numbers of the ST. LOUIS MEDICAL AND SURGICAL JOURNAL. Since the publication of Mr. Hope in the year 1840 it is the first time that this special medical object has been subjected to a closer investigation. I hope to have added some grains to the magnificent edifice of medical science.

THE AUTHOR.

ST. LOUIS, AUGUST, 1889.

ARTICLE I. STATISTICS.

In the February, 1889, number of the *St. Louis Medical and Surgical Journal*, a note of our esteemed confrere, Dr. F. L. James, was published on *Anthomyia Canicularis*, the larvæ of which were found in the vagina of a young lady suffering from nymphomania.

As I have some knowledge and experience concerning the matter in question, I have taken the liberty of adding some interesting points to the above cited article. In order to solve the question on the parasitism, or better, pseudo-parasitism of diptera in man, it is necessary to emphasize the fact that only such reports should be taken into consideration in which the animal found in any portion of the human body has been either classified by an authority (entomologist), or in which we are ourselves enabled to classify the larvæ from a detailed description, or better, from the illustrations furnished with the reports.

At the beginning of my article I would like to state that the literature of this subject is not at all scanty, as Dr. James supposed it to be. When we confine ourselves to the accounts of diptera in man, we must, first of all, state that, with the probable exception of the so-called *Oestridæ*, all other larval forms of diptera are only pseudo-parasites. Even the larvæ of different species of *Oestridæ* only occasionally occur in man.

A very clear article, full of sharp criticism on pseudo-parasites, was written by my teacher in Zoology, the well-known Prof. Karl Theodor Ernst von Siebold, for the second volume of Rudolph Wagner's "*Handwörterbuch der Physiologie*," a classical work in its time.

In this work Siebold distinguishes three classes of pseudo-parasites from a practical standpoint:

1°. The first class includes such animals as only occasionally live in places which are inhabited by true parasites.

2°. A second class is formed by those animals which have been supposed inhabitants of other animals, but of which this latter is not certain.

3°. The third class of pseudo-parasites are those objects which, *without being animals at all*, have been considered parasites. These "pseudo-parasites fictitii" are especially useful in warning us and proving the fact that the truth, often being obvious, may only be recognized with difficulty.

It is only the first class that will be considered here. To it belongs the larvæ of various diptera which live on and eat decomposed animal substances fresh or decaying vegetable matters; that is, they seek, with preference, localities having a bad odor.

Thus they may enter, as it is very easily understood, the human body, in a so to speak, active and passive manner. When they come in the neighborhood of a person with a foul smelling disease (for instance, diseases of the eyelids, ears, nose, flux albus, ulcers of the skin, abscesses, etc.), they are attracted by the odor and lay either their eggs or their maggots¹ near the diseased part. This is the more active way of invasion.

On the other hand, the eggs and small maggots of dipterous insects are

1. The different species of *Sarcophaginæ* do not lay eggs, but bear maggots.

swallowed by man, especially during the hot season. Under certain circumstances, these ingested fly-maggots continue to live in the digestive tract, but are later on expelled by vomiting or in the fæces, after having grown and having irritated too much the digestive canal.

A number of well observed cases of this kind have been reported in the following works:

1°. Hope, F. W., F. R. S., On insects occasionally found in the human body. (Transact. of the Entomolog. Society, 1840, Vol. II., p. 266, et. seq.).

This is the most valuable paper on this subject up to that time. In this the whole is brought together in a tabular form, so that the kind of insect, the local affection and various other particulars can be seen at a glance. Hope proposed to adopt the term *Canthariasis* for the diseases which originate with coleopterous insects, whether in the perfect or larval state; that of *Myiasis* for those caused by dipterous larvæ, while he restricts the term of *Scholechiasis* to those resulting from lepidopterous larvæ.

Of the first (including two cases arising from the earwig), he enumerates thirty-eight cases; of the second, sixty-four; of the third, seven.²

2°. Koch, Ammon's Monatsbericht fuer Medicin, Augenheilkunde und Chirurgie. 1838, Vol. I., p. 642.

3°. Tiedemann, von lebenden Wuermern und Insecten in den Geruchsorganen, p. 19.

As far as I know, only members of the Muscidae of the Diptera order have been found as pseudo-parasites, and among those more especially members of the following classes of Muscidae.

- a. Sarcophaginae represented by *Sarcophaga carnaria*, *S. latifrons*.
- b. Muscinae represented by *Musca* (seu *Calliphora*) *vomitioria*, *M. stabulans*, *M. domestica*.
- c. Anthomyiidae represented by *Anthomyia*³ *scalaris*, *A. canicularis*, *A. cuniculina*.

Whilst the various species of the two first named classes prefer animal substances in a more or less decaying state, the members of Anthomyiidae are attracted, as is partly expressed by their name, by decomposing vegetable matters. Therefore, it may be *a priori* supposed that the former are attracted by badly smelling discharges from natural cavities of the human body (nose, ear, vagina), or from suppurating or gangrenous ulcers, whilst the Anthomyiidae enter the intestinal tract with the nourishment.

And really, as far as I can gather from the literature, I find this line of

2. Confer: Kirby; Wm. and Spence, W., Introduction to Entomology, Philadelphia, 1846.

3. It is better to spell *Anthomyia* than *Anthomya*. The name was given to this family by its first exact observer, the German Entomologist Meigen, and means flower-fly (*Blumenfliegen*), from *anthos*-flower and *muia*-fly. The latter word is written *mua* only by Photius. It is therefore more correct to name the disease "myiasis" (better still "myiosis") than "myasis."

Illustrations may be found in Meigen, Systematische Beschreibung der bekannten Europäischen zweiflügeligen Insecten. Halle 1851, VII., Bde mit 74 T.

Bouché, Naturgeschichte der Insecten. Berlin 1834, Taf. vi., Fig 3-7.

Farre Arth. On the minute anatomy of the larva of *Anth. canicularis* Meig, with 1 plate. Transact. Royal Microsc. Society, p. 51-57. 1841.

reasoning verified. To the cases already reported in the above quoted general works⁴ I may add

a. *Sarcophaga latifrons*, found by Taschenberg⁵ "in a very painful ulcer of the ear."

b. *Sarcophaga Wohlfahrti*, observed by Dr. Thomas and Loew⁶ in the nose of an old lady.

c. *Sarcophaga carnaria* in the nose reported by Wohlfahrt⁷ and Froriep⁸.

d. *Musca vomitoria* has been found in the external meatus of the ear of persons suffering from stinking otorrhœa, reported by Voigt⁹, Troschel¹⁰ and Thienemann¹¹.

The larval forms of various species of Anthomyidæ that have been so far reported have only been observed in the stomach and intestines.

Exceptional cases are the Wernicke-case, reported by Dr. F. L. James¹², of the larvæ of *Anthomyia canicularis* in the vagina and that of Salzmann¹³ of the larvæ of *Anthomyia scalaris* in the urethra of a man.

While the latter case is the first undoubted one as to the occurrence of fly-larvæ in the urinary organs, cases of the former kind have already been observed. Ule-Wagner¹⁴ speaks of the vagina as a stopping place for the larvæ of Diptera, but without any special reference to any particular species. Another case of unclassified maggots, as thick as a quill, found in the vagina of a woman suffering from fluor albus was reported in the "Medizinische Vereinszeitung" of 1844, p. 175.

The opinion of Dr. Wernicke, cited in Dr. James' note (p. 78), that larvæ of Anthomyidæ "do not remain in the small intestine" seems to me not quite correct. For I myself¹⁵ saw a case in which the larval forms of *A. cuniculina* were vomited. The larvæ of *Anth. canicularis* were expelled in the same way in a case of Prof. Elsner, of Königsberg. The diagnosis was made by Siebold¹⁶. Ule-Wagner cites Meschede¹⁷ and Gerhard¹⁸, and says: "In very rare cases larvæ of Diptera pass to the stomach, remain there alive for several days and may cause intense catarrh of the stomach."¹⁹

Cases of dipterous larvæ found in the fæces occur more frequently. Sie-

4. To these may be added: Grube Ad. Ueber Vorkommen von *Sarcophaga*-maden in den Augen und der Nase des Menschen. Archiv fuer Naturgeschichte, 1853, Bd. i. p. 282-85

5. Brehm's Thierleben, Bd. IX. Taschenberg, Insecten.

6. Loew. Ueber Myiosis und ihre Erzeugung. Wiener Med. Wochenschrift, 1883, No. 31.

7. Wohlfahrt, Observatio de vermibus per nares excretis. Halæ 1768.

8. Froriep, Neue Notizen. 1837, Bd. 4, p. 12

9. Voigt, Medizinische Centralzeitung, Berlin, 1837, p. 674.

10. Troschel, Med. Vereinszeitung, Berlin, 1838, p. 35.

11. Thienemann, Provinz. Sanitätsbericht des K. Med. Collegiums z. Königsberg, 1842, p. 49.

12. F. L. James, Note on *Anth. canicularis*, etc., ST. LOUIS MEDICAL AND SURGICAL JOURNAL, 1889, No. 2.

13. Salzmann: Ueber das Vorkommen von Fliegenmaden in den Harnorganen und im Darmcanale des Menschen. Wuertemberg. Med. Correspbl., 1883, B. LIII, No. 7-8.

14. Ule-Wagner, Handbuch der Allgemeinen Pathologie, 1876, p. 183.

15. Unpublished. Observed in Germany, 1883.

16. Siebold in Vol. II. of R. Wagner's "Handwörterbuch der Physiologie." 1844.

17. Meschede, Virchow's Archiv, 1866.

18. Gerhard, Jenaer Zeitschrift, 1867, p. 454.

19. Ule-Wagner, Handbuch der Pathologie, 1876, p. 183.

bold²⁰ writes: "The footless larvæ of *A. scalaris* and *canicularis* usually cause a very disagreeable itching in the rectum of man, because the dorsum and the lateral parts of their ringed body are covered with stiff horny spines."

Larvæ of *Anth. scalaris* or *canicularis* in the fæces have been observed by Dr. von Duisburg and Klinsmann, the larvæ examined by Siebold. That even an authority like Siebold could not decide with certainty if the larvæ found were those of *Anth. scalaris* or *Anth. canicularis* shows us the great difficulty attending such investigations.²¹

The same larvæ were recognized by Siebold from the illustrations given with the reports of Bateman²² and Jenyns.²³

The larval forms of *Anth. scalaris* had been found by Salzmann²⁴ in the fæces of the wife, the husband of whom was suffering from the same larvæ in his urethra. The woman expelled the larvæ sometime previous to the affection of her husband, who had to be catheterized pretty often for urethral stricture.

Lastly, the larvæ of *Anth. cuculina*, observed by Dr. Wacker in connection with myself, classified by Prof. Siebold's first adjunct, Prof. Spangenberg, were found in the following case:²⁵ A pale looking farmer boy, with a dim glance and bloated features, complained of great fatigue, abdominal fullness, colic from time to time, irregular, slow action of the bowels, changeable appetite, and very frequent attacks of nausea and fainting. Helminthiasis was suspected, and under the use of *santonin*, two litres (about two quarts) of living maggots were expelled. The body of the larval forms of *Anth. cuculina* is whitish gray, spindle-shaped, 5 to 10mm long, divided by nine transverse rings into ten segments, and on the dorsum and lateral parts with feathered spines.

My next article will contain the report and illustration of two cases of fly-maggots found in the nose, both observed in this city last summer; the one by my brother, Dr. Henry Summa, the other by myself.

ARTICLE II.

HYPOTHESIS AND NEW OBSERVATIONS.

My investigations concerning the pseudo-parasitism of diptera in man led me to the conclusion that in the causation of myiosis (fly disease) there exist some differences *a.*, as to the manner of invasion of the dipterous

20. Op. citat.; confer No. 16.

21. Tossato (Un nuova entozoo, Riv. clin. de Bologna, 1883, No. 2) found peculiar larvæ about 1 ctm. long, the gray colored body of which was differentiated into a head, a thorax and an abdominal segment, the latter consisting of eight rings. An expert, Perroncito, classified them "very probably" as those of a dipterous insect.

22. Bateman. An account of the larvæ of two species of insects discharged from the human body. Edinb. Med. and Surg. Journal, Vol. VII., 1811, Fig. 3-4.

23. Jenyns, Notice of a case in which the larvæ of the dipterous insect, supposed to be the *Anthomyia canicularis* (Meig.) were expelled in large quantities from the human intestine. Transact. of the Entomolog. Society, Vol. 11., p. 152.

24. Salzmann, loc. cit. v. No. 13.

25. Wacker, Fr. Ueber das Vorkommen der Larve von *Anthomyia cuculina* im menschlichen Darmcanale. Aertzliches Intelligenzblatt, 1883, No. 11.

larvæ into the human body, and *b.*, as to the occurrence of certain genera of the diptera order in the different forms of the disease. In other words basing myself on what I observed and what I could gather from English and German literature, I have made the following hypothesis:

1°. Myiosis vulnerum, narium, aurium, conjunctivæ is always caused by different species of the Sarcophaginæ and Muscidæ, both genera being sometimes comprised under the term *Creophila*—flesh flies (perhaps of the *Œstridæ* also, which generally prefer, cattle, horses, sheep and the like).

2°. Myiosis intestinalis is always caused by various species of the genus *Anthomyidæ*¹.

3°. The cause of this strange distribution is based on a biological fact. Whilst the members of the Sarcophaginæ and Muscidæ, which "lay their larvæ on every animal structure or nutritive material derived from the animal kingdom subject to the laws of decomposition,"² directly invade natural cavities of the human body with badly smelling discharges, the different species of *Anthomyidæ* only indirectly enter the human body—that is, pass into the digestive canal by means of spoiled food.³

Since the publication of my first article on myiosis, I, of course, have continued my researches in medical literature, in order to find further proofs of the correctness of my hypothesis. American medical literature is not very rich concerning the matter in question. Nevertheless, the few instances, reported in American journals, are in full agreement with my hypothesis.

As to myiosis intestinalis, I have found only one case, reported in the last (posthumous) paper written by the great American entomologist Walsh,⁴ to whom the specimens were sent by a physician from Illinois. Walsh classified the larvæ as belonging to the genus *Anthomyidæ*. The account of another case was reported to me in a letter from Dr. B. F. Records,⁵ Smithville, Mo. This colleague observed, in the summer of 1886, a case of

1. I can hardly resist repeating the excellent and pregnant description of these two genera which Kuechenmeister gives in his great work: "On Animal and Vegetable Parasites of the Human Body," translated from the second German edition by Edw. Lancaster. Vol. II., p. 961. London, 1857. He says:

CREOPHILA—FLESH FLIES.

"Corpus compactum, abdomen rotundum, thorax latus, caput transversum, squamæ halteribus majores. Nonnullæ viviparæ. In juventute (statu larvalli) parasita."

ANTHOMYIDÆ—FLOWER FLIES.

"Squamæ sive alerons (alulets) halteribus minores. Antennæ retro repositæ tertio articulo oblongo. Oculi fere frontales, in maribus propinquoires. Corpus longum. Caput hemi-sphæricum. Larvæ 2 unguiculis ad os armatæ, in vegetabilibus putrescentibus viventes, sine pedibus."

2. Kuechenmeister, l. c. p. 96. All authors on the biology of diptera agree on this point. The chief point is the bad smell, by which these insects are attracted. "It is even said that these insects, deceived by the smell of the Arum flower, will lay their eggs on the pistil." (Confer: Van Beneden, P. I., *Animal Parasites and Messmates*. New York, 1876, p. 122).

3. Kuechenmeister (l. c. p. 96) writes: "It appears only to be possible for these animals to reach the human intestine indirectly and indeed by the use of vegetables which have stood for some time, and to which the female *Anthomyidæ* could have access. As vegetables of this kind, v. Siebold particularly refers to cabbages. I think any farinaceous food which has been kept and which is eaten cold is sufficient for the purpose."

4. The American Entomologist, an illustrated magazine of popular and practical entomology; edited by Chas. V. Riley. Vol. III (2 series Vol. I) New York, 1880.

5. I take this opportunity of thanking Dr. Records for this kind letter.

myiosis intestinalis ex *Anthomyia cuniculina* in a robust middle-aged farm hand. The larvæ were expelled by vomiting and in the fæces.

Cases of myiosis narium have been recently reported, as the readers of the ST. LOUIS MEDICAL AND SURGICAL JOURNAL will well remember, by Dr. A. M. Powell.⁶ There is hardly any doubt that the larvæ found in the two cases reported belonged either to the genus *Sarcophaga* or *Musca*. Another case in which the larvæ of the blue-bottle fly (*Musca vomitoria*) have been found, was reported by A. E. Prince,⁷ Jacksonville, Ills., in the *Philadelphia Medical News*, Oct. 14, 1882.

The article on the parasitism of insects in man, in Quain's Dictionary of Medicine,⁸ has been written by T. L. Cobbold, in an almost superficial manner. The author mentions that "the occurrence in the human body of the maggots of various species of fly has been frequently noticed (*Musca domestica*, *Musca carnaria*, *Musca sarcophaga*,⁹ *M. vomitoria*)." He states also that numerous cases of the larvæ of *Anthomyia canicularis* have been observed; "several of these have occurred in the writer's (Cobbold's) practice." But we seek in vain to find out in what localities these parasites occurred.

Only one author, Fr. Kuechenmeister, in his above cited work, contains a sentence contradictory to my hypothesis: "The maggots of the flesh-eating flies (viz. *Sarcophagineæ* and *Muscidæ*) occurring in the human stomach and intestines, certainly get into the alimentary canal by the use of decaying cheese, spoiled ham and other cold meats during the latter part of the summer and autumn." Kuechenmeister himself gives, not only not a single instance to prove his assertion, but on the contrary, in another place in his work (p. 97) he declares that the flesh-eating flies especially prefer the orbits and ears, and also every part of the body where there is the least abrasion or discharge.

And, indeed, we may be glad that this is the case. For if we take into consideration the great destructions, which the larvæ of the flesh-eating flies cause in the nares, for instance, if we remember that these larvæ penetrate and devour living tissues, we must concede that the occurrence of these maggots in the intestinal tract would necessarily lead to a perforation of the stomach and intestines, and very probably to perforative peritonitis. The reason for this fact that maggots of the flesh-eating-flies do not pass into the alimentary canal is, that food inhabited by these larvæ would be refused by man on account of its offensive smell and taste, whilst decaying vegetables do not smell so badly and are generally eaten prepared as salads, in which the vinegar used covers smell and taste.

In short, up to this date, not one single case can be found, in which the myiosis intestinalis was caused by any other dipterous larva than by species

6. Myasis Narium. By A. M. Powell, M. D., of Collinsville, Ills. ST. LOUIS MEDICAL AND SURGICAL JOURNAL, 1888, Vol. LV., No. 4.

7. Abstract of this communication to be found in ST. LOUIS MEDICAL AND SURGICAL JOURNAL, 1888, Vol. LV., No. 6.

8. A Dictionary of Medicine edited by Richard Quain. 7th edition, New York, 1884. Article: *Cestrus*, 1057-8.

9. It is unknown to me that *Musca carnaria* and *Musca sarcophaga* are different species. To my knowledge they are the same.

of the Anthomyiidae, but that all the other forms of myiosis were produced by by various species of flesh-flies.

As being in full accord with my hypothesis, I will quote the following two cases of myiosis narium, the description of which I promised in my first article:

CASE I.—Myiosis narium e larvis muscæ vomitoria (fly-disease of the nose caused by the invasion of the larvæ of the blue-bottle fly), observed by Henry Summa, M. D.

The patient, John S., 28 years old, gardener, suffered for some time from nasal obstruction, foetor e naribus and occasional bloody discharge from the nose. About the middle of July, 1888, after dinner, the patient lay down under a tree for an hour's rest. Some six to seven days afterwards, he began to feel an itching sensation high up in his nose, which finally developed into pain. The pain was at first confined to the nose, then radiated over the forehead, later on over the whole head. Suffering, at this time, great pain, the patient became aware of worms falling down his nose, three to four at once. On the sixth day of his suffering, the patient estimated the number of maggots, which had fallen out of his nose, as a few hundred. When my brother saw the case, there was fever (temperature 102° F., pulse 96), very profuse hæmorrhage from the nose, and vomiting. To relieve the pain, morphine in $\frac{1}{4}$ grain doses was given. Irrigation with a 1-2000 solution of corrosive sublimate, twice daily, for five days. Some worms, which came out of the nose after the application, died immediately, while some lived from half an hour to one hour. The patient was directed to take some albuminous water (egg-water) and raw eggs to avoid any injurious results to the stomach from mercurial intoxication. The patient was entirely freed of the disease on the eighth day.



Figs. 1 and 2. Pupa and Fly, natural size. *a*, Pupa; *b*, Fly. The latter is of a deep steel blue color, and seems to be identical with the ordinary Blow-fly.

The accompanying illustrations (Figs. 1 and 2) represent the pupa and the fly developed from it from specimens which my brother procured in the following manner: He took one of the living maggots which he had extracted and placed into a little paper box. Then he fed it with some raw beef. On the fifth day, on opening the box, he found the pupa, and on the tenth day the fly, illustrated above.

The fly belongs to the species *Musca vomitoria* (blue-bottle fly—meat or blow-fly). I regret that my brother did not preserve one of the larvæ. I will refer those who take an interest in this matter to the illustrations to be found in Brehm¹⁰ and Duncan.¹¹

The larva of the blue-bottle fly (*M. v.* seu *M. erythrocephala* [Aut. recent.])

10. Brehm's Thierleben, Band IX: Taschenberg, Insecten, p. 476.

11. Duncan, P. Martin: The Transformation of Insects, Philadelphia. On page 404 there is an illustration representing the metamorphosis of the flesh-flies (*Calliphora vomitoria* and *Sarcoph. carnaria*).

is legless and bears two blackish-brown points at its abdominal extremity; it has a very complicated oral extremity; its margin is divided in a radiate form and it has six spiracles on the abdomen. In eight days it attains its normal size without changing its skin and becomes converted into an egg-shaped dark-brown pupa by mere thickening of the skin. From this the fly escapes in few days. The fertility of this fly is so great that Réaumur counted 20,000 maggots in an oviduct $2\frac{1}{2}$ ''' long.¹²

CASE II.—*Myosis narium e larvis Sarcophagæ carnariæ* (fly disease of the nose caused by the invasion of the larvæ of the common flesh-fly.) Personal observation.

On the 14th of September, 1888, a well-built man H., about 34 years of age, was brought to my office, complaining of very severe headache, insomnia, anorexia and constipation. He was hardly able to see with his left eye. His nose and the surrounding parts, especially on the left side, were swollen and of an erysipelatous appearance. Rhinoscopia anterior was impossible on account of the great swelling of the nasal mucous membrane. There was such an offensive smell that I desisted from further examination. Believing that it was a case of erysipelas, I ordered something for external use and a mixture of analgesine and morphine internally (against the fever and pain), but without any relief to the patient. The next day I was called to see the patient at his home. A closer examination at the bedside proved the case to be one of *myosis narium*. On examining the patient's mouth I found an ovoid-shaped hole corresponding to the sutura palatina and situated partly in the soft, partly in the hard palate. The hole was somewhat more than one inch long and about one-fourth of an inch broad; its border of a dark bluish color. In the depth of the hole a numberless quantity of maggots could be seen and partially removed with a forceps. The discharge from the hole and nostrils was not purulent, but sero-sanguinolent. The smell was so offensive that I myself had to vomit about five times, before I was able to work on the patient.

My orders were: Injections of 5% solution of carbolic acid, cooled on ice, to be repeated every half an hour. When I saw the patient again on the evening of the same day no signs of amelioration could be detected except that the swelling of the nostrils had somewhat diminished so that maggots could be removed from the nostrils and from the mouth. The patient's wife had continued during the whole day to remove maggots mechanically; the injections of the carbolic acid solution did not influence the maggots at all. I, again, had first to vomit pretty often before I had overcome the odor. Then I removed at least fifty maggots. To my great regret I had to stop the treatment because my nervous system was too much affected. Another physician took care of the patient and about fourteen days later I saw the latter walking about.

On questioning him as to his history, I was told that the patient had suffered from ozæna for a long time, that he went fishing and hunting in Illinois in the latter days of August and passed a few nights out-doors. Some days afterwards the symptoms of the nasal affection became aggravated and caused him to seek medical advice.

12. Confer: Kuechenmeister, l. c. p. 97.

The illustration (Fig. 3) gives a good idea of the larva found in this case. Illustrations of some portions of the larval form more highly magnified are

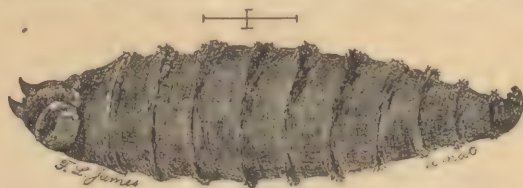


Fig. 3. Larva, magnified 5 diameters, seen from above.

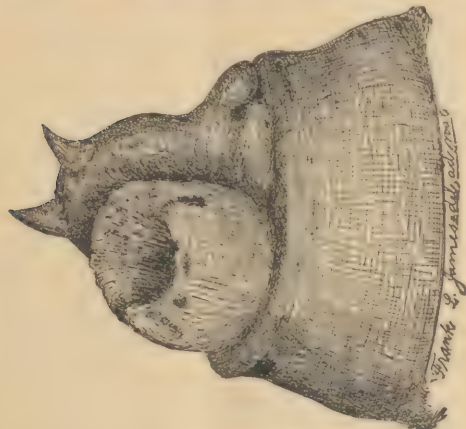


Fig. 4. Tail of Larva, magnified 30 diameters, showing the anal vent.



Fig. 5. Head segment of larva.

given in Figures 4 and 5. Other illustrations of the pupa and the fly may be found on page 180 of the "Seventh Annual Report on the Noxious, Beneficial and other Insects of the State of Missouri, by Chas. V. Riley, State Entomologist."¹³

13. Jefferson City, 1875. The illustration represents, according to Riley, the larva, pupa and fly of *Sarcophaga Sarracenia* (Riley). But Riley confesses himself that it so closely resembles the flesh-fly that it is probably only a variety (p. 181.)

ARTICLE III.

CLINICAL HISTORY OF MYIOSIS.

Let us now endeavor to sketch the clinical history of myiosis. We have, first of all, to distinguish three different groups:

1°. *Myiosis vulnerum*.

2°. *Myiosis narium, aurium, conjunctivæ, vaginæ* and

3°. *Myiosis intestinalis*.

Whilst the first and second groups agree in their etiology, the second and third groups resemble each other more in the general symptomatology, inasmuch as in both groups there are to be distinguished symptoms of a purely local nature and symptoms which are reflex.

1°. *Myiosis vulnerum* (fly disease of wounds), the so-called living wounds.

ETIOLOGY.—A wound becomes a living wound provided that it is accessible to the female flies of the genus *Creophila* (*Sarcophaginae* and *Muscidae*). A second condition is that the wounds have been badly managed, putrid, septic. It is worth knowing that even the short time occupied in dressing is sufficient to enable the fly to deposit her brood in it if particular care be not taken. All forms of myiosis occur only in summer and autumn, in temperate climates as well as in hot.

SYMPTOMATOLOGY.—To the naked eye such wounds appear as if beset with headless nails, which rise and fall with the extension and contraction of the animals whilst sucking. When the position of the larvæ is superficial, we distinctly see their white bodies which are 2" in thickness; the head sits with its hooklets in the bottom of the wound, which usually secretes no pus, but only a bloody watery fluid, and has a bluish pale, and after the removal of the animals, a spongy appearance. The black hinder parts and the respiratory orifices are directed outwards.¹⁴

TREATMENT.—The best is to remove the larvæ mechanically, with the forceps. It is sometimes pretty difficult to seize them; if not grasped firmly they rapidly creep back. My fellow-countryman Pruner-Bey, who observed a great many cases of *myiosis vulnerum* in Egypt, tried milk, but without success; Kuechenmeister recommends a weak infusion of tobacco. After the removal of the larvæ, the cavities which they have made and the excrescences in their neighborhood soon heal.

2°. *Myiosis narium, conjunctivæ, etc.*

ETIOLOGY.—In these cases also an invasion of various species of the genus *Creophila* into the natural cavities of the human body causes the disease. But here too it is to be mentioned that the natural cavities must be diseased in some way before the invasion takes place. This is a leading feature in all reports on *myiosis narium, conjunctivæ, etc.* The most common larvæ to be found in these cases are those of the common flesh-fly (*Sarcophaga carnaria*) and of the blue-bottle (meat fly, *Musca vomitoria*).

SYMPTOMATOLOGY.—The symptoms, which are in most cases of a very serious nature, are caused partly by the local affection which the larvæ produce, partly by reflex action. In the first days of the disease only local symptoms appear. In *Myiosis narium* the internal and external parts of the nose

14. Confer as to the description of the symptomatology of the living wounds: Kuechenmeister, *Fr.*, l. c. p. 97.

begin to swell and become red. These and general symptoms, as fever and great loss of strength, in a superficial examination may lead to the erroneous diagnosis of erysipelas. Reflex symptoms¹⁵ set in very rapidly, sometimes of the greatest danger, which may even lead to death. Intolerable headache, insomnia, convulsions and coma have been observed in nearly half the number of cases reported. If the diseases have been diagnosed early enough, even very serious symptoms may quickly disappear after the treatment has satisfied the *indicatio causalis*, viz: after the removal of the larvæ. My own case, reported above, may serve as a paradigm of the great extent of the local symptoms in myiosis narium. As an instance of very serious reflex symptoms accompanying myiosis narium, I will sketch a case, observed and reported by Dr. A. Wolynez¹⁶ in 1884. The patient suffered for a long time from coryza and slept out-doors in June. On the next day the nose became red and swollen. Headache occurred and rapidly increased. On the sixth day she was confined to bed. Twice, during the day, convulsions developed, accompanied by the loss of consciousness. There was complete apathy; fixed look at one point; pupils dilated. Temperature normal,¹⁷ pulse 96. After the removal of the worms consciousness returned and the patient recovered. In this case the reflex symptoms exceeded the local. Sometimes the contrary takes place. The local symptoms were very serious in the cases of Dr. A. M. Powell and myself. Not only destruction of soft tissues have been observed, but even large pieces of bones had to be removed.¹⁸

I can not forbear mentioning a case which should never be lost sight of. Although it does not strictly belong to myiosis narium, yet it is of great interest as it illustrates the varieties of pseudo-parasitism of insects in man. I report only the main features.¹⁹ Delasiauve describes a case, observed by Duménil and Legrand Désaulle, of hystero-epilepsy in consequence of larvæ in the sinus frontalis. A girl, 9 years old, was, one day in the month of October, 1850, suddenly seized by violent pain in the region of the forehead, which was most severe over the sinus. Photophobia, vertigo, titillation on the nasal mucous membrane and repeated sneezing, soon appeared. This state lasted for six weeks without remission.

The child became irritable and passionate. Her irritability, however, soon gave way and the girl became more quiet, complaining of a peculiar heat between the eye-brows, and asserting that she had passed small grains and animals on sneezing. These bodies passed off from the patient for nearly two months. Prof. Brulle, of Dijon, examined the insects and discovered larvæ

15. It is not necessary to call the attention of my colleagues to the legion of reflex symptoms, very frequently due to nasal affections. Since the well known publication of my teacher, the late lamented Prof. Hack, of Freiburg, this matter has attracted the attention of the whole medical world.

16. Wolynez, A. Wuermer in der Nase. *Wratsch*, 1884, No. 23. (Extract in *Centralblatt fuer Chirurgie*," 1884, No. 43.)

17. The temperature is usually increased.

18. Dr. A. C. Bernays observed such a case last summer; he told me that he removed parts of the osseous structures of the nose.

19. Reports in extenso may be found in Delasiauve "*Gazette Hebdomadaire*," Sept. 28th, 1856. Graevell, Fr. G. *Notizen fuer practische Aerzte ueber die neuesten Beobachtungen in der Medizin* 1856, Vol. VIII, p. 443-445. Kuechenmeister, Fr. 1. c. Appendix B relating to the insects, p. 246 et. seq.

of five different kinds, viz: Chrysomelines, Stratyomydes, Dermestes lardarius, Casteles, Scolopendron.

On the 25th of March, 1851, the child lost its consciousness; scarcely recovered, she fell into convulsions for several hours. On the 28th day of April she was brought to the insane asylum of the department of the Côte d'Or. No larvæ in the secretion of the nose for the next four days. During following days more than fifty attacks of convulsions.

May 2nd. In the secreted nasal mucus were found several larvæ, which repeatedly showed themselves during the fortnight following. Duménil ordered that unsized paper dipped into a solution of two grammes of arseniate of soda in thirty grammes of distilled water, and rolled into cigarettes, should be given to the girl to smoke, advising her at the same time to draw in the smoke through the nostrils. This procedure was repeated every morning and evening. Up to the 23rd of May no new attack. On that day Legrand witnessed 33 attacks, accompanied, like the first, by mental aberration. May 30, several withered larvæ made their appearance. June 10th, numerous larvæ. June 15th, two convulsive attacks, but without mental aberration. July 14th, symptoms satisfactory. July 15th, after a thunderstorm and a walk in town five slight attacks. From that time up to her leaving the asylum, November 8th, her health remained undisturbed. No return took place for three years and a half.

Myiosis conjunctivæ also occurs only when accompanying malignant inflammation of the eyes. The larvæ nestle under the eyelids, and in Egypt, for instance, produce there a very serious addition to the effects of small-pox upon the cornea, as, according to Pruner-Bey,²⁰ in such cases a perforation of the cornea usually takes place.

TREATMENT.—In most cases, especially in those of not too great a severity, we have only to deal with the indicatio causalis. The surest way is the careful removal of the maggots with a forceps. But in respect to the anatomical structure of the nose, this method alone will not give full satisfaction. Two other methods are the injection of fluids and the insufflation of powders.

Solution of carbolic acid did not satisfy me at all. On this point I fully agree with Powell²¹ and Wolynez,²² who both saw themselves forced to use other remedies. Therefore, we must deny T. S. Cobbold's²³ assertion that "for those larvæ that occur in wounds or ulcers or near the surface, nothing is better than the application of carbolic acid solution."

Solutions of corrosive sublimate have good effects but are a little dangerous. Very interesting are the experiments made by Dr. A. M. Powell, who found injections of chloroform diluted with sweet milk very effective. Van Beneden's son-in-law, Dr. Vanlair, informed him that citric acid or the juice of lemons is efficacious in destroying the insect *Lucilia hominivorax*.²⁴ This

20. Pruner-Bey. Die Krankheiten des Orients vom Standpunkt der vergleichenden Nosologie. Erlangen, 1847.

21. ST. LOUIS MEDICAL AND SURGICAL JOURNAL, 1888, No. 4, p. 208.

22. Centralblatt fuer Chirurgie, 1884, No. 43.

23. Quain's Dictionary of Medicine, 1884, p. 1058.

24. Van Beneden, l. c. p. 120. *Lucilia hominivorax* is a dipterous insect which is very dangerous to man in South America.

remedy, which can be easily procured, should be, without doubt, tried first of all in future.

Insufflation of iodoform was tried by Powell and Wolynez and satisfied both observers.

Another method could be tried which to my knowledge has not yet been attempted in man, but which has given very satisfactory results in myiosis of cattle, sheep and the like,²⁵ viz: the use of sternutatories (e. g., the so-called Schneeberger snuff, or a kind of snuff prepared from *Marum verum*, mixed with finely powdered insect powder).²⁶

3°. Myiosis intestinalis.

ETIOLOGY.—In opposition to the other forms of myiosis the intestinal fly-disease is produced by larvæ of various species of the genus *Anthomyia*, (flower-flies). They indirectly pass into the alimentary tract by the use of improper food. The larvæ of *Anthomyia canicularis*²⁷ and *Anth. cuculina* have been most frequently observed.

SYMPTOMATOLOGY.—The clinical history of myiosis intestinalis has great similiarity with that of helminthiasis. Nevertheless there are some points of difference. Myiosis intestinalis is an acute disease, acute at least in its beginning. It begins always during the warm season, and only in exceptional cases may last through the whole winter. Lastly, the reflex symptoms are of greater intensity than in most cases of helminthiasis.²⁸

According to the stopping place within the intestinal canal, the symptoms differ. Generally speaking, most cases of myiosis intestinalis lead to the diagnosis of a serious intestinal affection.²⁹ Occurrence of the larvæ in the stomach causes the symptoms of an intense catarrhus ventriculi; sometimes uninterrupted vomiting until the complete evacuation of the stomach. If the larvæ live in the upper parts of the intestine, we may observe disagreeable

25. Kuechenmeister, l. c. p. 245, appendix B., relating to the insects.

26. I think this the proper place to add some points as to the so-called screw-worms.

We have to distinguish between the true giddiness or true gid (*wahre Drehkrankheit*), occurring only in sheep, and the pseudo-gid (*falsche Drehkrankheit*), occurring in cattle, sheep and the like. Whilst the true gid is caused by *Cænurus cerebialis* (the cysticercus of *tænia cœnura*), the pseudo-gid is caused by the larvæ of various species of the *Æstridæ* genus of the *Diptera* order, in most cases by the larvæ of *Æstrus bovis* (*Ox-bot-fly*). The so-called screw-worm is mostly the larva of this species. The true gid is an instance of true parasitism, the pseudo-gid of pseudo-parasitism. As to the word gid, I refer my readers to *Dunglison, Robt., A Dictionary of Medical Science, Philadelphia, 1874.*

27. In order to obtain specimens of this larva, so as to be able to know what they are like in cases of necessity, Kuechenmeister advises to look after the larvæ in the intestines of dogs, where they occur by no means rarely in autumn and winter.

28. A very peculiar case of Helminthiasis occurred in my practice three months ago. A young man, 26 years old, since two years in this city, became sick five years ago, at that time residing in Rolla, Mo. Every fortnight, generally on the same day, the patient felt pains in the right hypochondrium, which "continually increased and wandered up the right nipple, from here to the left nipple, and then remained in the heart" (patient's statement). The patient then lost consciousness for two hours sometimes. The next eight days he felt very weak, lost in weight (as he exactly observed, usually six pounds), and until the next attack he regained weight again. A prominent physician here advised him to stop taking medicine. My treatment was based on the diagnosis of helminthiasis, and consisting in the administration of *santonin*, promptly freed the patient of his trouble (*ascaris lumbricoides*).

29. Confer especially: *Storia di grave affezione intestinale sussegitita dall' evacuazione di una particolare specie d'insetto nello stato di larva. "Gazzetta medica di Milano," 1843, p. 305.*

sensations about the epigastrium, which sometimes is described as a tremulous motion, anorexia, fullness of the abdomen, constipation, general weakness, etc. In the rectum, the larvæ with their spinous bristles on the back and sides produce a very unpleasant itching.

TREATMENT.—The therapeutic measures fully agree with those usually ordered in cases of helminthiasis.

Common to all three groups are the prophylatic measures. Each case of neglect regarding our body, may it consist in overlooking unimportant affections (as catarrh of the nose), or uncleanness (for instance, of wounds or ears), or improper food, will be punished by nature. The final goal of medical science and art is not to cure diseases, but to prevent them. Not the science of therapeutics, but the science of prophylaxis, the science of hygiene must be and will be the keystone of medicine. And if the postulate of prophylaxis can now be fulfilled—and it ought to be—then we can attain this goal by preventing cases of parasitism and pseudo-parasitism.

St. Louis, April 1889.

